

REMARKS

Claims 1-20 are now pending in the present application. Claims 1, 8 and 15 have been amended and claims 16-20 have been added. Claims 1, 8 and 20 are independent. Reconsideration of this application, as amended, is respectfully requested.

Rejections Under 35 U.S.C. § 102

Claims 1-15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Jones, USPN 976,573. Claims 1-15 stand rejected under 35 U.S.C. § 102(b) as being anticipated by Schaack, USPN 2,556,298. These rejections are respectfully traversed.

Independent claim 1 of the present invention is directed to a rolled steel sheet pile, wherein a combination of elements are recited including the recitation "said first and second joints are designed so that a contact surface formed between the engaging edge portions of the pair of interfitted joints is a line contact and an axis of the line contact inclines toward the protrusions of the pair of interfitted joints."

Independent claim 8 of the present invention is directed to a metal sheet pile, wherein a combination of elements are recited including the recitation "said first and second joints are designed so that a contact surface formed between the pair of interfitted joints is a line contact and an axis of the line contact inclines toward the protrusions of the pair of interfitted joints." Applicants respectfully submit that the references relied on by the

Examiner fail to teach or suggest the present invention as recited in independent claims 1 and 8.

With regard to the Jones reference, this reference is directed to a straight web-type sheet pile as can be clearly understood from FIG. 1 of this reference. Since independent claims 1 and 8 of the present invention recite first and second end flanges, Applicants respectfully submit that the Jones reference fails to anticipate the independent claims of the present invention for at least this reason. Specifically, Jones fails to disclose first and second end flanges, since Jones only discloses a web portion 2 that extends between the first and second joints.

In addition, the Jones reference fails to disclose the contact surface between the pair of interfitted joints as recited in independent claims 1 and 8 of the present invention. Referring to FIG. 3 of Jones, it is clear that the interface or wall 5 that forms a contact surface between the engaging edge portions of the joints is a line contact; however, the wall 5 is arranged transverse to an axis of the web portion 2 (see lines 38-44 of Jones). In view of this, an axis of the line contact of Jones does not incline toward the protrusions of the pair of interfitted joints as recited in independent claims 1 and 8 of the present invention. Accordingly, the Jones reference fails to anticipate independent claims 1 and 8 for this additional reason.

A straight web-type sheet pile as disclosed in the Jones reference is mainly used for the construction of cellars or caissons which have a columnar shape by connecting a plurality of straight web-type sheet piles. Because a straight web-type sheet pile is used for

such a columnar shape, the mechanical strength and interlocking strength of the joints are required mainly to resist a hoop tension, while the cross-sectional rigidity of the joints is not so important. As the Examiner correctly points out, the Jones reference discloses an interfitted joint similar to the present invention in that a center of a point of a symmetry of a pair of interfitted joints is located on or near a central line of a web, and the mechanical strength and the interlocking strength of the joints are achieved in the Jones reference. However, since cross-sectional rigidity is not required in the joints disclosed in the Jones reference, an axis of the line contact between the pair of interfitted joints is perpendicular to the web portion in the Jones reference. Sufficient cross-sectional rigidity of the joints is not achieved by such a design.

On the contrary to the joints disclosed in the Jones reference, the joints according to the present invention meet the requirement for both cross-sectional rigidity and interlocking strength of the joints by making a center of a point of symmetry of a pair of interfitted joints located on or near a center line of the flanges and by making an axis of a line contact inclined toward protrusions of the pair of interfitted joints. Since the present invention meets the requirement for both cross-sectional rigidity and interlocking strength of the joints, the present invention can be used for earth-retaining structures, fundamental structures, bank protection structures and water cut-off walls.

Since cross-sectional rigidity is not required in a straight web-type sheet pile, the present invention which refers to an inclined axis of a line contact is not suggested by the

Jones reference. Accordingly, the Jones reference fails to anticipate independent claims 1 and 8 of the present invention.

With regard to the Schaack reference, as mentioned above, the claims of the present invention define a line contact between connecting portions of the pair of interfitted joints. The Schaack reference; however, discloses joints which form a hinge structure that have a point contact. In each of the embodiments of Schaack, the interfitting joints contact each other about a point, so that the joints can pivot with respect to each other. Specifically, referring to column 1, line 41-column 2, line 2 of Schaack, the joints are disclosed as making “point contact” with each other. This is accomplished by making the contact surfaces of the joints have an arcuate or curved shape. Since independent claims 1 and 8 recite that the first and second joints are designed so that a line contact is formed between the pair of interfitted joints, Applicants respectfully submit that the Schaack reference fail to anticipate independent claims 1 and 8 of the present invention for at least this reason.

It should also be noted that it is not clear in the Schaack reference whether the sheet pile of Schaack has both a first end flange and a second end flange as recited in independent claims 1 and 8 of the present invention. However, it is supposed that the sheet pile disclosed in the Schaack reference is a straight web-type sheet pile because it is stated “this invention relates to sheet piles, such as are used for the construction of cellular or gabioned caissons, dams or the like (see column 1, lines 1-3). For a sheet pile which is used for cellular or gabioned caissons, drums or the like, the mechanical strength and

interlocking strength of the joints are required mainly to resist a hoop tension while the cross-sectional rigidity of the joints is not so important. As the Examiner correctly points out, the Schaack reference discloses a pair of interfitted joints that are similar to the present invention in that a center of a point of symmetry of the pair of interfitted joints is located on or near a center line of a web, and the mechanical strength and interlocking strength of the joints are achieved in the Schaack reference, however, since the cross-sectional rigidity is not required much in the joints disclosed in the Schaack reference, the reference is totally silent about a line contact between the connecting portions of the pair of interfitted joints. Rather, the Schaack reference discloses pivotal joints which allow much play in connecting sheet piles and, by which, sufficient cross-sectional rigidity is not obtained.

On the contrary to the joints disclosed in the Schaack reference, the joints according to the present invention meet the requirement for both cross-sectional rigidity and interlocking strength of the joints by making a center of a point of symmetry of a pair of interfitted joints located on or a near center line of the flanges and by making a contact surface formed between the connecting portions of the pair of interfitted joints a line contact.

Because the present invention meets the requirement for both cross-sectional rigidity and interlocking strength of the joints, the present invention can be used for earth-retaining structures, fundamental structures, bank protection structures and water cut-off walls.

Because cross-sectional rigidity is not required much in a sheet pile disclosed in the Schaack reference, the present invention which refers to a line contact is not taught or

suggested by the Schaack reference. Accordingly, the Schaack reference fails to anticipate independent claims 1 and 8 of the present invention.

With regard to dependent claims 2-7 and 9-15, Applicants respectfully submit that these claims are allowable due to their respective dependence upon independent claims 1 and 8, as well as due to the additional recitations in these claims.

In view of the above amendments and remarks, Applicants respectfully submit that claims 1-15 clearly define the present invention over the references relied on by the Examiner. Accordingly, reconsideration and withdrawal of the Examiner's rejections under 35 U.S.C. § 102 are respectfully requested.

Additional Claims

Additional claims 16-20 have been added for the Examiner's consideration.

With regard to dependent claims 16-19, Applicants respectfully submit that these claims are allowable due to their respective dependence upon independent claims 1 and 8, as well as due to additional recitations in these claims.

With regard to claims 16 and 17, these claims recite "wherein the fitting grooves of said first and second joints open in opposite directions." Applicants respectfully submit that the Jones and Schaack references fail to disclose this aspect of the present invention. Specifically, referring to FIG. 1 of Jones, the fitting grooves clearly open in the same direction. In Schaack, since only the joints of two adjacent sheet piles are illustrated, the Schaack reference clearly fails to disclose fitting grooves that open in opposite directions

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as recited in dependent claims 16 and 17. Accordingly, the Jones and Schaack references fail to anticipate these claims of the present invention.

With regard to dependent claims 18 and 19, these claims recite “wherein said first and second end flanges are connected to first and second webs, respectively, the first and second webs are connected to each other via a central flange located therebetween.” In Jones, only a web portion 2 is disclosed. There are no end flanges or first and second webs as recited in dependent claims 18 and 19 of the present invention. With regard to the Schaack reference, since only the joints of adjacent sheet piles are illustrated, the Schaack reference fails to disclose first and second end flanges, first and second webs and a central flange as recited in claims 18 and 19 of the present invention. Accordingly, the Jones and Schaack references fail to anticipate independent claims 18 and 19 of the present invention.

With regard to independent claim 20 of the present invention, this claim is directed to the subject matter of original claims 1 and 3. Since the Jones and Schaack references fail to disclose first and second joints that are point-symmetric and fitting grooves that open in opposite directions as recited in claim 20 and as originally recited in dependent claim 3, Applicants respectfully submit that the Examiner’s rejection of original claim 3 was improper and therefore independent claim 20 should be in condition for allowance.

Favorable consideration and allowance of additional claims 16-20 are respectfully requested.

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CONCLUSION

Since the remaining reference cited by the Examiner has not been utilized to reject the claims, but merely to show the state-of-the-art, no further comments are deemed necessary with respect thereto.

All the stated grounds of rejection have been properly traversed and/or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently pending rejections and that they be withdrawn.

It is believed that a full and complete response has been made to the Office Action, and that as such, the Examiner is respectfully requested to send the application to Issue.

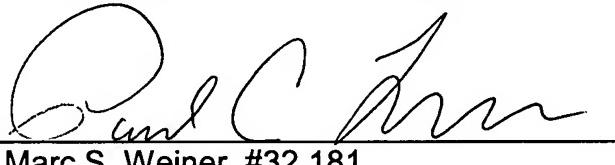
In the event there are any matters remaining in this application, the Examiner is invited to contact Paul C. Lewis, Registration No. 43,368 at (703) 205-8000 in the Washington, D.C. area.

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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies, to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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